

THE ACCURACY OF FORECASTS.¹

By JEAN MASCART.

[Abstracted from *Comptes Rendus* (Paris Acad.) Oct. 16, 1922, pp. 627-629.]

There are two distinct tendencies in forecasting, one toward general, long-range forecasts, and the other toward very specific, short-period forecasts.² The use for which the forecast is made largely determines this tendency. The verification of the forecast is always a troublesome feature, for weather which may be favorable to one interest may be disagreeable to another. To be verifiable, the forecast should be precisely worded, for in a general forecast some part of it is almost certain to be verified.

Robert H. Scott, former head of the English Meteorological Office, stated that a verification of 70 per cent of the forecasts should be considered creditable. Sir Napier Shaw gives a figure of 56 per cent for forecasts 36 hours in advance. This leads the author to conclude that if claims of accuracy as high as 80 to 95 per cent are made they must be either utterly fantastic or based upon very general forecasts.

Rough found upon testing Köppen's assertion made a long time ago that the weather tends to preserve its character, and hence that the weather of to-morrow will resemble the weather of to-day, that of 100 forecasts, 40 were good, 40 were fair, and 20 were bad. This is somewhat lower than was claimed by Köppen for certain forecasting rules which were not made public. One is left in doubt, therefore, as to what constitutes a satisfactory accuracy of verification.

It has often been loosely stated that on the basis of chance one should be able to forecast with 50 per cent accuracy. The author has tried this out in three experiments, using very precise forecasts, as follows:

(1) A person names a certain date at random, and a second person writes a forecast. This was done for a period covering more than six years. The accuracy was found to vary with the season, but in the mean the verification gave an accuracy of 52.2 per cent.

(2) Given a list of all the days in the year, a forecast is written for each. The accuracy varied from 50 per cent in December to 68.8 per cent in June.

(3) Based upon the statistics of 70 years, a forecast of rain positively worded—rain or no rain—gave a verification of 45.6 per cent in December to 66.7 per cent in June, a mean for the year of 54.4 per cent.

In the above experiments (1) and (2) the forecaster was familiar with the locality and its climate.

It seems from these considerations that 60 per cent is a reasonable lower limit for the satisfactory verification of forecasts upon the condition that the forecasts are very precise.

The author concludes upon the basis of his experience that an accuracy of 80 per cent in regional forecasts for 36 hours in advance is entirely to be hoped for.—C. L. M.

¹ La proportion des réussites dans la prévision du temps.

² The author implies that the tendency toward long-range forecasting is characteristic of work in the United States, owing to the agricultural and economic demands, and he cites the weekly forecast issued each Saturday. While it is true that this forecast has important bearing upon activities in the fields mentioned, it must not be forgotten that the short-time forecast for the use of aviation and other interests is given even greater attention by forecasters and students in the United States.

ON A WIDE-ANGLE LENS FOR CLOUD RECORDING.¹

By W. N. BOND.

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The special feature of this lens is that its field of view embraces a complete hemisphere, so that if the lens is arranged to face vertically upward all clouds visible may be recorded photographically on a single flat plate or film. The resultant photograph is circular, the clouds at the zenith being reproduced at the center of the circle and those near the horizon appearing near the edge of the circle. The resultant image differs from the true image by a very small amount.—A. J. H.

CONCERNING A METHOD FOR THE DETERMINATION OF PERIODS.

By E. RUBENSTEIN.

[Abstracted from *Meteorologische Zeitschrift*, September, 1922, pp. 272-276.]

In 1911 and 1913, W. Schmidt published papers relating to the determination of long periods in meteorological data² to which the present author takes exception.

[For the reader's information, the following brief abstract from the second paper mentioned above, gives the nature of Schmidt's method:

Given a series of values a_1, a_2, a_3, \dots we may write the differences of the individual values from the mean of the series, a , as

$$\begin{aligned} a_1 - a &= a'_1 \\ a_2 - a &= a'_2 \\ &\dots \end{aligned}$$

Adding these values, step by step, we obtain,

$$\begin{aligned} b_1 &= a'_1 \\ b_2 &= b_1 + a'_2 \\ &\dots \end{aligned}$$

Carrying the process further, we may take the difference between individual values b_1, b_2, b_3, \dots and their mean b , thus obtaining the values b'_1, b'_2, b'_3, \dots just as a'_1, a'_2, a'_3, \dots were obtained above. Similarly, this will lead to the values

$$\begin{aligned} c_1 &= b'_1 \\ c_2 &= c_1 + b'_2 \\ &\dots \end{aligned}$$

Thus the various series b and c are closely related to the original data, and constitute, respectively, first and second integrations of the original function.

The original amplitude A when the integration embraces n intervals becomes $nA/2\pi$, and thus n is related to the amplitude of the curve representing the integral. If the operation is repeated, i. e., if the second integration is performed, the amplitude becomes $n^2A/4\pi^2$. Thus the amplitude varies directly as the square of the

¹ Cf. Fassig, O. L., *MO. WEATHER REV.*, 43:274.

² Nachweis von Perioden langer Dauer. *Met. Zeit.*, 1911, pp. 401-407; *ibid.*, 1913, pp. 392-394.